

DETAILED ACTION

1. Claims 1 – 28 are presented for examination

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), a certified copy of Foreign Priority Application PCT/GB 2004/005340, dated 27 January 2005, which papers have been placed of record in the file.

Information Disclosure Statement

3. No Information Disclosure Statement was filed with this application.

Claim Objections

4. Claims 4 and 16 are objected to because of the following informalities:

Line 2 of claims 4 and 16: "...an output voltage in the range 0 200V"; the range indicated in this phrase is unclear. For the purposes of examination, it is assumed that "...an output voltage in the range 0 - 200 V" is the intended meaning.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 24 – 28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

7. As to claim 24, the method described in the specification on Page 4, lines 6 - 21, lines 26 - 36, and Figure 2 will not result in a resistance value of $4R$, as recited in the specification and the instant claim.

8. As to claims 25 – 27, they are rejected as being dependent on a base claim that is rejected under 35 U.S.C. 112.

9. As to claim 28, the method described in the specification on page 5 will not result in the tabulated resistance values found on page 5. The instant claim is therefore non-enabling, as it will not enable one of ordinary skill in the art to make and use the claimed multi-value reference loop.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 2 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term “of the order of 1 kHz” in the instant claims is a relative term which renders these claims indefinite. The term "of the order of 1 kHz" is not defined by the claims, the specification does not provide a standard for

ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 101

12. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

13. Claim 24 - 27 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a credible asserted utility or a well established utility.

Specifically, the method as set forth in claim 24 will not result in a measurement that is either physically meaningful or useful to a person of ordinary skill in the art. Moreover, the method disclosed in claim 25, "in which the resistance is measured in a Wheatstone bridge arrangement" is not sufficiently detailed to allow a person of ordinary skill in the art to make a physically meaningful measurement. As to claims 26 and 27, no meaningful additional disclosure is contained in the specification that might enable a person of ordinary skill in the art to make a physically meaningful measurement; therefore the claim lacks credible utility.

Claims 24 - 27 are also rejected under 35 U.S.C. 112, first paragraph. Since the claimed invention is not supported by either a credible asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1, 2, 7, 12 - 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Murphy (US Patent 5,378,992, January 3, 1995, hereinafter referred to as Murphy). As to claims 1 and 12, Murphy discloses a method and apparatus for measuring the loop self-impedance of shielded wiring having:

Injecting into the loop through an inductive injection probe a sinusoidal drive signal at a given frequency to produce a predetermined current in the loop [claim 1] (Figure 5, item 20; figure 6, item V_s);

Sinusoidal drive signal generating means generating a sinusoidal drive signal at a given frequency [claim 12] (Figure 5, item 20; figure 6, item V_s);

Measuring, by a test probe also inductively coupled to the loop, the true RMS drive signal voltage and induced current [claim 1] (Figure 5, item 22);

An inductive injection probe adapted to inject said sinusoidal drive signal into the loop [claim 12] (Figure 5, item 20; Figure 6, item V_s);

Calculating the loop resistance from the measured RMS values [claim 1] (Column 6, lines 40 – 50; Column 7, lines 48 - 50).

Calculating means for calculating the loop resistance from the measured RMS values [claim 12] (Column 6, lines 40 – 50; Column 7, lines 40 - 45).

16. As to claim 2, Murphy discloses a method having:

The given frequency is of the order of 1 KHz. [claim 2] (Column 7, lines 50 – 55).

17. As for claim 7, Murphy discloses a method having:

In which current is measured across a burden resistor [claim 7] (Figure 12, item Z_{known}).

18. As for claims 13 - 14, Murphy discloses an apparatus having:

The drive signal generating means generates a drive signal above 200 Hz [claim 13] (Column 7, lines 52 – 57);

The drive signal generating means generates a drive signal at a frequency of the order of 1 kHz [claim 14] (Column 7, lines 50 - 55).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 6, 8, 9, 11 and 17 - 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy.

21. As to claims 6, 8, 9 and 11, although Murphy discloses a method having substantial features of the claimed invention, Murphy fails to disclose a method having:

Drive signal voltage and induced current are measured using a multimeter arrangement [claim 6];

The burden resistor has a value of 10Ω [claim 8];

The injection and test probes have a turns ratio of 1000:1 [claim 9];

The measured signals are digitally filtered to accept only the given frequency [claim 11].

Nonetheless, these features are well known in the art and would have been an obvious modification of the method and apparatus disclosed by Murphy. It would have been obvious to a person of ordinary skill in the art to apply the methods and features recited in the instant claims, as applying a known technique to a known device, to achieve predictable results. Specifically, the use of a multimeter to measure a voltage or current as recited in claim 6 is recognized as a part of the ordinary capability of one skilled in the art. One skilled in the art would further recognize the necessity of using a burden resistor with a small resistance value, such as 10Ω , as recited in claim 8, in order to measure a current resulting from a voltage in millivolts impressed across it. The use of an inductive probe with a high turns ratio to couple input and output signals to a loop resistance, as recited in claim 9, would have been recognized by a person of ordinary skill in the art as necessary in order to make accurate measurements. The use of analog or digital filters, in order to filter out unwanted frequencies, is within the ordinary capabilities of one skilled in the electrical test and measurement art, and would have been obvious to a person of ordinary skill in that art.

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22. As to claims 17, 18, 20, 21, 22, and 23, although Murphy discloses an apparatus having substantial features of the claimed invention, Murphy fails to disclose an apparatus having:

Audio amplifier means connected to supply the injection probe [claim 17];

A multimeter for measuring drive voltage and/or induced current [claim 18];

The burden resistor has a value of 10Ω [claim 20];

The injection and test probes have a turns ratio of between 500:1 and 2000:1 [claim 21];

The injection and test probes have a turns ratio of 1000:1 [claim 22];

A digital filter to filter the signals to accept only the given frequency [claim 23].

Nonetheless, these features are well known in the art and would have been an obvious modification of the method and apparatus disclosed by Murphy. It would have been obvious to a person of ordinary skill in the art to apply the apparatus and features recited in the instant claims, as the application of a known technique to a known device, to achieve predictable results. Specifically, the use of an audio amplifier, as recited in claim 17, to amplify the input power to the injection probe is within the ordinary capabilities of one skilled in the art, as is the use of a multimeter to measure a voltage or current, as recited in claim 18. One skilled in the art would further recognize the necessity of using a burden resistor with a small resistance value, such as 10Ω , as recited in claim 20, in order to measure a current resulting from a voltage in millivolts impressed across it. The use of an inductive probe with a high turns ratio to couple input and output signals to a loop resistance, as recited in claims 20 and 21, would have been

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recognized by a person of ordinary skill in the art as necessary in order to make accurate measurements. The use of analog or digital filters, in order to filter out unwanted frequencies, is within the ordinary capabilities of one skilled in the electrical measurement art, and would have been obvious to a person of ordinary skill in that art.

23. As to claim 19, Murphy discloses an apparatus having

A burden resistor across which induced current is measured [claim 19] (Figure 12, items V_{out} , Z_{known}).

24. Claims 3 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy in view of Allen et al. (US Patent 4,648,060, March 3, 1987, hereinafter referred to as Allen).

25. As to claims 3 and 15, although Murphy discloses a method and apparatus having substantial features of the claimed invention, Murphy fails to disclose a method or apparatus having:

The sinusoidal signal is generated by a microcontroller using a digital to analogue converter [claim 3];

The drive signal generating means comprise a microcontroller with a digital to analogue converter [claim 15].

Nonetheless, these features are well known in the art and would have been an obvious modification of the method and apparatus disclosed by Murphy, as evidenced by Allen. In an analogous art, Allen discloses a dual channel frequency synthesizer system having:

The sinusoidal signal is generated by a microcontroller using a digital to analogue converter [claim 3] (figure 5B, item 209; Column 7, lines 45 -46) in order to generate the sinusoidal signal at a single selected frequency;

The drive signal generating means comprise a microcontroller with a digital to analogue converter [claim 15] (figure 5B, item 209; Column 7, lines 45 -46) in order to convert a digital signal to a sinusoid at a single selected frequency.

Given the teaching of Allen, a person of ordinary skill at the time of the invention would have readily recognized the desirability and advantages of modifying Murphy by employing the well known or conventional features of microcontrollers and digital to analogue converters, as taught by Allen, in order to provide a sinusoidal signal at a selected frequency to supply an injection current probe, and for the purposes discussed above.

26. Claims 4, 5 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy in view of Allen, as applied to claims 3 and 15 above, and further in view of Maeda et al. (US Patent 5,055,877, October 8, 1991, hereinafter referred to as Maeda).

27. As to claims 4 and 16, Murphy in view of Allen discloses a method and apparatus having substantial features of the claimed invention:

To convert a microcontroller generated 0 - 10V signal [claim 4, 16] (Column 7, lines 45 -46).

Although Murphy in view of Allen discloses a method and apparatus having substantial features of the claimed invention, Murphy in view of Allen fails to disclose a method or apparatus having:

An output voltage in the range 0 200 volts [claims 4, 16];

Nonetheless, this feature is well known in the art and would have been an obvious modification of the method and apparatus disclosed by Murphy in view of Allen, as evidenced by Maeda. In an analogous art, Maeda discloses an apparatus having:

An output voltage in the range 0 200 volts [claims 4, 16] (figure 12, items 27, 39);
in order to scale the amplitude of the sinusoidal signal.

Given the teaching of Maeda, a person of ordinary skill at the time of the invention would have readily recognized the desirability and advantages of modifying Murphy in view of Allen by employing the well known or conventional features of scaling amplitudes of sinusoidal signals, as taught by Maeda, in order to provide a sinusoidal signal with sufficient voltage amplitude to drive an injection current probe, and for the purposes discussed above.

28. As to claim 5, while Murphy in view of Allen and further in view of Maeda disclose substantial features of the claimed invention, Murphy in view of Allen and further in view of Maeda do not disclose:

The output voltage is supplied to the injection probe through audio amplifier means [claim 5].

Nonetheless, this feature is well known in the art and would have been an obvious modification of the method and apparatus disclosed by Murphy in view of Allen and further in view of Maeda. It would have been obvious to a person of ordinary skill in the art to use an audio frequency amplifier as recited in the instant claim, as the application of a known technique to a known device, to achieve predictable results. Specifically, the

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use of an audio amplifier, as recited in claim 5, to amplify the input power to the injection probe is a common technique in the electrical testing art. Its use would have been obvious to one of ordinary skill in that art.

29. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy in view of Agilent Model E1411B 5.5 Digit Multimeter (Agilent E1411B 5.5 Digit Multimeter, C-Size Data Sheet, printed 1 May, 2004, hereinafter referred to as Agilent).

30. Although Murphy discloses substantial features of the claimed invention, Murphy fails to disclose a method having:

Measurements are made to a resolution of 5 ½ digits or 21 bits [claim 10].

Nonetheless this feature is well known in the art, and would have been an obvious modification of the method disclosed by Murphy, as evidenced by Agilent. In an analogous art, Agilent discloses a multimeter having:

Measurements are made to a resolution of 5 ½ digits or 21 bits [claim 10] (Page 1, paragraph 1), in order to achieve sufficient measurement precision.

Given the teaching of Agilent, a person of ordinary skill at the time of the invention would have readily recognized the desirability and advantages of modifying Murphy by employing the well known or conventional features of 5 ½ digit multimeters, as taught by Agilent, in order to achieve sufficient measurement precision, and for the purposes discussed above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN M. BALDRIDGE whose telephone number is

(571)270-1476. The examiner can normally be reached on Monday through Friday 7:30AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Benson can be reached on 571 272 2227. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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